



# Measuring the Fiscal Health of Municipalities

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## **Abstract**

One of the difficulties faced in the effective and efficient management of public organizations is the understanding of when the organization is experiencing financial distress. Administrators and researchers alike have typically relied upon ratio analysis for this determination, but too heavy of a reliance on ratios can produce misleading results. Using 150 municipalities from the Fiscally Standardized Cities (FiSC) database for the period of 1977 to 2012, this study reconsiders the measurement of fiscal health through an exploration of several predominate approaches. The efficacy of the measurement approaches is tested with a series of event history analyzes that captures their utility in predicting municipal bankruptcy.

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# Measuring the Fiscal Health of Municipalities

## Introduction

A key challenge facing the administration of municipalities in the United States is their ability to meet their service commitments and obligations (Jacob and Hendrick 2013; McDonald 2015). This challenge became prevalent in 2008 with the commencement of what has been termed the Great Recession. During this period, administrators were faced with declining revenue while simultaneously addressing an increase in demand for goods and services in areas such as unemployment, healthcare, and housing (Kiewier and McCubbins 2014; Scorsone, Levine, and Justice 2013). Constraints on the ability of a municipality to provide services create not only hardships in the daily management of the government but also tension between public administrators, who seek to sustain the organization, and the citizenry, who seek to reap the benefits of public goods. Evidence of the problem of constraints and the resulting tension can be seen in the decision of municipalities to file for bankruptcy, with more than 50 municipal bankruptcy filings in the United States since 2010 (Governing 2015).

Despite the growing concern about the constraints of local municipalities, we have very little at our disposal to understand when the constraints become too much and the fiscal health<sup>1</sup> of the municipality is in jeopardy. This is largely due to an uncertainty within the public finance literature on the most appropriate means of measuring fiscal condition (Honadle, Costa, and Cigler 2004; Jacob and Hendrick 2013; Trussel and Patrick 2013). Administrators and researchers alike have typically relied upon ratio analysis for this determination, but too heavy of a reliance on ratios can produce misleading results (Altman 1968). In response to the failure of ratio analysis, a number of other approaches have been undertaken, but these are largely ad hoc and are wrought with inconsistencies in the conclusions they provide (see Bird 2015; Justice and Scorsone 2013). Without a good approach to the measurement of a government's financial condition, how are administrators to know if the government is in jeopardy?

The aim of this paper is to reconsider how we measure the financial condition of a government through an exploration of several predominate approaches. The efficacy of the measurement approaches is tested with a series of rare event history analyzes that captures their utility in predicting an extreme financial event: municipal bankruptcy. To complete the analyses, a panel of 150 municipalities from the Fiscally Standardized Cities (FiSC) database for the period of 1977 to 2012 is adopted.

The main finding is that our current approaches to understanding fiscal health are not sufficient predictors of fiscal distress. In testing the utility of ratio analysis, this study found mixed results with only half of the ratios having a meaningful influence on municipal bankruptcy. Wang, Dennis and Tu's Solvency Test also produced mixed results with significance appearing in some the dimensions, but all influence going away when considered from the perspective of their financial condition index. Lastly, Brown's 10-point Test had no distinguishable influence on the bankruptcy status of a municipality.

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<sup>1</sup> For the purpose of this study, fiscal health and financial condition are used interchangeably.

To explore this issue, the remainder of this paper is structured as follows: The first section, *What is Fiscal Health*, introduces the subject of fiscal health in the context of governments, paying particular attention to how it is defined and what the condition intends to reflect. Next, *Measuring Fiscal Health* provides an overview of key measurement systems. Then an event history analysis model of municipal bankruptcy is developed to test the validity of the measurement systems in *Model, Data, and Methodology*. Data and methodological issues are also addressed. The results of the analysis and discussion of the findings are provided in the section that follows. The paper closes with a series of comments on the importance of the findings, their implications for practitioners and researchers, and a recommendation for future work.

### **What is Fiscal Health**

The financial resources of municipalities are important. They are central to the capacity of a government to provide or expand a program or service. Concern within the field of public administration as to the adequacy and efficient management of these resources dates to the start of the twentieth century with the work of the New York Bureau of Municipal Research as it sought to clean up New York City's financial position as a means to improve the city's services (McDonald 2010). More mainstream attention to the condition of government finances began in the 1970s with the looming financial crisis of New York City (Arnett 2013). The experience of New York City and others who faced bankruptcy in the 1970s and 1980s shaped that concept of fiscal health that is currently used in the literature. Simply stated, financial condition is understood as the ability of a government to balance its financial obligations with its available revenue streams (Arnett 2013; Hendrick 2004; Jacob and Hendrick 2013). A government is considered fiscally healthy if its resources meet its obligations; if it does not have the resources then it may be experiencing fiscal stress.

In general, the fiscal condition of a municipality can be viewed through the lens of four dimensions. These are: (1) the ability of the municipality to meet its immediate or short-term financial obligations; (2) the ability of the municipality to meet its financial obligations over a budgeted fiscal year; (3) the ability of the municipality to meet its long-term financial obligations; and, (4) the ability of the municipality to finance the base level programs and services as required by law. A multi-dimensional approach allows for the consideration of where the municipality is in meeting the needs of the citizenry while considering the demands that are placed on the organization in the future. Inherent to this is the ability of the municipality to withstand unforeseen disruptions, such as an economic recession or change in the demographics of the residents.

### **Measuring Fiscal Health**

While the concept of fiscal health is straightforward, the determination of a government's financial position is not. Public finance researchers attributed this to a poorly defined concept and one that is inherently difficult to measure (Bahl 1984; Benson, Marks and Raman 1988). The measurement systems that arose were dependent on the preferences of the researcher, their unit

of analysis, and the data available to them. As a result, considerable disagreement exists within the literature on how it can best be measured (Maher and Nellenberger 2009; McDonald 2015; Wang, Dennis, and Tu 2007).

Dozens of measurement approaches have been used within the literature and still more have been developed by practitioners, often as an ad hoc version of one from the literature that has been modified to fit the government’s needs. A number of states have developed their own systems of measuring the fiscal health of their local governments (Pew Charitable Trusts 2016). North Carolina, for example, monitors the audits of its local governments for signs of distress and approving the issuance of all debt. Ladd and Yinger (1989) developed a measure that incorporated the capacity of a government to raise revenue relative to the tax burden and expenditure needs. The International City/County Management Association developed its Financial Trend Monitoring System (FTMS) which incorporates 36 different financial indicators across 11 areas (Groves, Godsey, and Shulman 1981). In recent years FTMS has been updated to include 42 indicators that incorporate environmental and organizational factors as well as financial (Nollenberger, Groves, and Valente 2003). Despite the utility these approaches provide, they are cumbersome to estimate and provide little guidance on the actual condition of the government.

While no single measure of financial condition has emerged (Jimenez 2009), several have become more prominent in use. The analysis conducted here chooses to focus on three of these systems. These include ratio analysis, Brown’s (1993) 10-point test, and Wang, Dennis, and Tu’s (2007) solvency test. The decision to focus on these three is based on the prominence of the system, such as ratio analysis which rests as the foundation of most approaches.

### Ratio Analysis

Behind all measures of fiscal health is the use of ratio analysis. Ratio analysis is the examination of a financial relationship between items as a means of identifying trends in financial behavior or position (Kieso, Weygandt, and Warfield 2001). Functionally, it expresses the relationship as a percentage, rate, or proportion. An example using the current ratio—the ratio of current assets to current liabilities—is provided in table 1. The use of ratios provides a degree of standardization for a government to capture its results over time or against other organizations. As a process for examining trends, however, ratio analysis is not a direct measure of financial condition but rather a series of indicators on where the government is heading. A ratio that is trending upwards, for example, may indicate that the government is heading in a financially positive direction.

**Table 1: Expressions of Ratio Analysis**

<b>Expression</b>	<b>Description</b>
Percentage	Current assets are 105% of current liabilities
Rate	Current assets are 1.05 times as great as current liabilities
Proportion	The relationship between current assets and current liabilities is 1.05:1.

How the measurement of a government's condition is carried out with ratio analysis is largely determined on the type of financial obligation a researcher is interested in. A researcher interested in the immediacy of a government's capacity to provide services may be interested in the measurement of its efficiency ratio (the ratio of total expenditures to total revenue) whereas someone that is interested in the government's ability to pay for its pension programs may be interested in coverage ratios (ratios that reflect the capacity of an organization to meet its short-term and long-term liabilities). In their textbook on financial management for public administrators, Finkler, Smith, Calabrese and Purtell (2017) recommend 19 different ratios to be used in analysis, though many other ratios are also available for use. This can be seen in the FTMS, which relies on 29 ratios for part of its calculation (Groves, Godsey, and Shulman 1981).

The freedom to choose which ratios to utilize is a benefit in many ways as it allows for the analysis to be customized to the unique circumstances of a government. The freedom, however, also highlights a downside of ratio analysis. Without an established set of measures there is no assurance that a true picture of fiscal health is being captured. Further, the results produced by a ratio are not necessarily consistent across other ratios. This allows for gaming, such that administrators can selectively choose ratios that give the desired appearance of a government's condition. How to address these shortcomings are the focus of most measurement systems, including two of those included in this paper.

### **Brown's 10-Point Test**

One of the most commonly used measurement systems is Brown's 10-point test (Honadle, Costa, and Cigler 2004; Mead 2013). Brown (1993), in conjunction with the Government Finance Officers Association, had intended to establish a means of measuring fiscal health that was both easy to use and easy to understand. Ratio analysis provided useful information, but there is variability in terms of which ratios governments should use and the interpretation of ratios can provide uncertain results.

Functionally, the 10-point test is dependent upon ratio analysis for its results, but it centers on only those that are most commonly used. Each of the points is a financial ratio that captures one of five dimensions of financial position. However, rather than facing the same difficulties present in ratio analysis, Brown adds an approach for indexing and comparability based on benchmarking. This is accomplished by calculating each of the ratios used in the test for both the government of interest and a group of similarly sized localities. Ratios are then quartiled to see which quartile relative to its peers the government falls into. Each quartile is given a score of "–1" for the first quartile to a "2" for the fourth across all of the ratios. The result is a score of fiscal health that ranges between "–10" and "20". The interpretation of the score is relative to the peer group included in the study, such that a score of "10" or more places the government among the best and a score of "–5" or under among the worst.<sup>2</sup> An overview of the test and its points is provided in table 2.

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<sup>2</sup> For an example of calculation and application of Brown's test, see Maher and Nollenberger (2009).



**Table 2: Brown's 10-Point Test**

<b>Indicator</b>	<b>Type</b>	<b>Measurement</b>
Total Revenues per Capita	Revenue	Total revenues for all governmental funds (excluding capital project funds) divided by population
Intergovernmental Revenues/Total Revenues Percentage	Revenue	Intergovernmental revenues for the general fund divided by total general fund revenues
Property Tax or Own Source Tax Revenues/Total Revenues Percentage	Revenue	Total tax revenues levied locally for the general fund divided by total general fund revenues
Total Expenditures per Capita	Expenditure	Total expenditures for all governmental funds (excluding capital project funds) divided by population
Operating Surplus or Deficit/Operating Revenues Percentage	Operating Position	General fund operating surplus or deficit divided by total general fund revenues
General Fund Balance/General Fund Revenues Percentage	Operating Position	General fund unreserved fund balance divided by total general fund revenues
Enterprise Funds Working Capital Coverage Percentage	Operating Position	Current assets of enterprise funds divided by current liabilities of enterprise funds
Long Term Debt/Assess Value Percentage	Debt	Long term general obligation debt divided by total general fund revenues
Debt Service/Operating Revenues Percentage	Debt	General obligation debt service divided by total general fund revenues
Postemployment Benefit Assets/Liabilities Percentage	Unfunded Liability	Funded ration (i.e. actuarial value of plan assets/actuarial accrued liability)

Source: Maher and Nollenberger (2009, p. 62)

One of the biggest arguments for the test is its simplicity (Crosby and Robbins 2013; Maher and Nollenberger 2009). Not only are the ratios easy to calculate, but the data necessary for the analysis can be found in the financial reports of any local government. This allows any government to determine where they fall in comparison to others and to render an interpretation of that position as one of financial condition. The test, however, is not without its faults. The ratios utilized may have been those that are most commonly used at the time, but there is no research to support whether they were the correct ratios. The ratios utilized focus on the government's general fund, ignoring the broader financial picture. Nor is there any evidence to support the structure of the grading scheme. Perhaps more importantly, the test does not establish a true understanding of fiscal health, but rather only produces an indication of how well the government is doing in comparison to others. This can allow for the test to be gamed by choosing comparison municipalities that are having financial difficulty.

## Wang, Dennis, and Tu's Solvency Test

More recently, Wang, Dennis, and Tu (2007) sought to produce an approach to understanding financial condition that addressed some of the shortcomings present in earlier attempts. They argued that the focus should be on the measurement of a government's financial condition rather than on the factors that drive or determine it. It was hoped that the result would be an expression of a government's actual condition rather than an indication of where it was headed. Central to their approach was an understanding of financial condition as a reflection of the government's financial solvency; that is, the ability of the government to meet its long-term financial obligations.

To develop a method of estimating fiscal health, Wang, Dennis, and Tu (2007) began with the four dimensions of solvency: cash, budget, long-run, and service. For each dimension, a series of indicators were adopted, producing a total of 11 indicators that were typically based on the government's financial ratios and were in the context of the Governmental Accounting Standards Board (GASB) Statement No. 34. An overview of the dimensions and their respective indicators is provided in table 3.

**Table 3: Wang, Dennis, and Tu's Solvency Test**

<b>Indicator</b>	<b>Type</b>	<b>Measurement</b>
Cash Ratio	Cash	(Cash + Cash Equivalents +
	Solvency	Investments)/Current Liabilities
Quick Ratio	Cash	(Cash + Cash Equivalents +
	Solvency	Investments + Receivables)/Current
		Liabilities
Current Ratio	Cash	Current Assets/Current Liabilities
	Solvency	
Operating Ratio	Budget	Total Revenues/Total Expenses
	Solvency	
Surplus (Deficit) per Capita	Budget	Total Surplus (Deficit)/Population
	Solvency	
Net Asset Ratio	Long-Run	Restricted and Unrestricted Net
	Solvency	Assets/Total Assets
Long-Term Liability Ratio	Long-Run	Long-Term (Non-Current)
	Solvency	Liabilities/Total Assets
Long-Term Liability per Capita	Long-Run	Long-Term (Non-Current)
	Solvency	Liabilities/Population
Tax per Capita	Service	Total Taxes/Population
	Solvency	
Revenue per Capita	Service	Total Revenues/Population
	Solvency	
Expenses per Capita	Service	Total Expenses/Population
	Solvency	

Source: Wang, Dennis, and Tu (2007, p. 8–9)

To transition the results from a series of indicators and into measurement of condition, they followed the premise of Brown's point based test but moved it away from peer-comparison towards standardization. After adjusting the direction of the results for the indicators to ensure that they do not cancel each other out, the results were averaged across each dimension. The result was a score for each dimension that could then be summed together for a single measure of health referred to as a Financial Condition Index (FCI). Arnett (2014) later expanded the approach by using the average of the z-scores for the indicators and adding a weight to each dimension. Weighted dimensions could then be added together for an indexed measure of condition.

Adopting a standardized approach allows for the comparison of a government's FCI across time, but adding a weighted component also allows for comparability across governments (Arnett 2014; Hummel 2015; Wang, Dennis, and Tu 2007). In many ways, this addressed the shortcomings of a ratio analysis and Brown's test. Additionally, the data necessary for the estimation comes from the annual financial reports of the government, making such comparisons easy to produce. With the utility comes uncertainty regarding the validity as indicators were chosen based on common use and face-validity and attempts to test the validity was based on the FCI's relationship to socioeconomic variables.

### **Model, Data, and Methodology**

The primary goal of the present study is to establish the validity of the systems of measuring fiscal health in predicting extreme occurrences of fiscal activity, specifically municipal bankruptcy. To accomplish this goal, I utilize an event history analysis (EHA) approach.<sup>3</sup> EHA is concerned with patterns and causes of qualitative changes (or "events") at a given point in time. The intent is to determine how a variable, or set of variables, affected the probability that an organization would transition into a new social state.

The EHA is accomplished in two steps: First, the risk set of the analysis must be defined. Second, the event model must be established. The definition of the risk set for this study is based on the 150 municipalities represented in the Lincoln Institute of Land Policy's Fiscally Standardized Cities (FiSC) database for the period of 1977 to 2012. During this period, 12 of the municipalities declared bankruptcy or had an emergency board imposed as an alternative to filing. The final risk set comprises 5,400 observations, of which 114 observations (about 2.1%) involve financially distressed cities.

Turning attention towards the event model, the extant literature provides no clear model of government bankruptcy behavior. To move beyond this limitation, I follow the literature on fiscal health and adopt a systems approach (see Hendrick 2004; McDonald 2015; and Nollenberger, Groves, and Valente 2003). Within this approach, cities are viewed as open organizations that not only influence their environment, but whose policies and decisions are also influenced by their environment (Cyert and March, 1963; March and Simon, 1985). Accordingly, the behavior of a government and the policies it produces are viewed as a function of the

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<sup>3</sup> For more information about event history analysis, see Berry and Berry (1990), Box-Steffenmeier and Jones (1997), and McDonald and Gabrini (2014).

environment from the community in which it resides, as well as the institutions that frame its structure and guide its governance.

From this literature, the following model of an event history analysis of municipal bankruptcy is suggested:

$$B_{i,t} = \Psi(\varepsilon_1 H_{i,t-1} + \varepsilon_2 G_{i,t-1} + \varepsilon_3 D_{i,t-1} + \varepsilon_4 E_{i,t-1})$$

where the dependent variable  $B_{i,t}$  is the hazard rate of the probability that municipality  $i$  will file for bankruptcy in year  $t$ . The fiscal health of the municipality is reflected as  $H$ . The variables  $G$ ,  $D$ , and  $E$  capture the political/governmental, demographic, and economic conditions of the municipality in the given year.

Furthermore,  $\Psi$  denotes the cumulative normal distribution of the model. The hazard rate is measured as a dummy variable where a “0” or a “1” were used to signify whether the municipality filed for bankruptcy. Assuming a municipality in bankruptcy is likely to remain in the state for more than the year of bankruptcy filing, a “1” is assigned to all years in which the municipality remains in bankruptcy. As a result, the estimation of the model takes a logit form. To accommodate for the small number of bankruptcies in the dataset, the Firth approach is utilized. The Firth approach counteracts the bias of a small sample in maximum likelihood estimation by adding a term to deal with the first-order term of the asymptotic expansion of the bias (see King and Zeng 2001, and Wang 2014). Having previously established the risk set, data on municipal bankruptcies were obtained from the financial archives of the individual municipalities and the Municipal Securities Rulemaking Board. The simple statistics for all study data are offered in table 4.

**Table 4: Simple Statistics**

<i>Variable</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min.</i>	<i>Max</i>
<b>Dependent Variable</b>				
Filed for Bankruptcy	0.0211	0.1437	0	1
<b>Independent Variable</b>				
Efficiency Ratio	1.0291	0.4495	-8.6571	22.3618
Debt Service Ratio	1.2941	0.9606	-17.3023	23.6038
Cash Ratio	0.0000	1.0000	-0.0382	64.9709
Current Ratio	0.0167	1.2898	-0.0382	76.9894
Brown's Test	4.5	3.2539	-6	14
FCI	0.0911	1.1036	-0.2446	68.9512
Cash Solvency	0.0055	1.0926	-0.0381	68.9770
Budget Solvency	-0.0396	0.0148	-0.2451	0.3008
Long-Run Solvency	0.0007	0.0939	-0.0763	1.6021
Service Solvency	0.1244	0.1111	-0.0018	1.3723
Council-Manager	0.4383	0.4962	0	1
Mayor-Council	0.4962	0.5000	0	1
Authority	0.6800	0.4665	0	1
Governor	0.5000	0.5000	0	1
Midwest	0.2133	0.4096	0	1
Northeast	0.1400	0.3470	0	1
Pacific	0.1600	0.3666	0	1
South	0.3666	0.4819	0	1
Hispanic	0.1042	0.1382	0.0025	0.8218
Male	0.4924	0.0428	0.4627	0.5474
Aged 0 to 17	0.2604	0.0361	0.1336	0.4762
Aged 18 to 65	0.6202	0.0466	0.3793	0.7539
Ages 66+	0.1193	0.0407	0.0186	0.3926

Following the discussion of fiscal health measurement systems provided in the previous section, three systems are tested here. These include ratio analysis, Brown's (1993) 10-point test, and Wang, Dennis, and Tu's (2007) solvency test, measured as both the individual dimensions and as the FCI. The data necessary to estimate these approaches is from the FiSC database. For the purposes of estimating the quartiles necessary for the 10-point test, the municipalities included in the database will serve as the peer governments.

Accounting for political and governmental influence on bankruptcy decisions, three variables are reported. Broadly, these are: *Form*, *Authority*, and *Governor Party*. In the model, form represents the form of government that the municipality adheres to. Measurement for the variables follows the IMCA's typology and is retrieved from their municipal yearbooks. In the model, form is reflected as two dummy variables (*Council-Manager* and *Mayor-Council*) with cities adhering to the commission form serving as the reference group. Authority reflects a series of dummy variables that control for whether a state specifically authorizes municipal bankruptcies, conditionally authorizes, authorizes under limitations, or does not have specific authorization. Information on the authority is obtained from state statutes. In these variables, a "1" reflects the

presence of the authority and a “0” its absence. To account for political influences, we follow the extant literature and rely upon the political affiliation of the governor as a reflection of local political beliefs. The political affiliation of the governor’s from 1977 to 2011 is drawn from Klerner’s (2013) Governors Dataset. Data on 2012 affiliations is obtained from websites of each states. The variable is measured as a dummy, where a “0” was assigned for a Republican controlled governorship and a “1” for when it was Democratic controlled. In eight observations the control transitioned from one party to another during the year. In these instances, party affiliation was assigned based on which party maintained control during the majority of the year.

Next, three variables are included to control for other variations of municipalities throughout the dataset. *Hispanic* is the log of Hispanic share of the municipality’s population and *Male* is the log of its male share of the population. Three variables account for the respective age of the population within the municipality. These are *0 to 17*, *18 to 65*, and *66 and older*, where each variable reflects the log of the share of the population aged within the variables brackets. The population estimates necessary for these measurements are obtained from the Economic Database of Woods and Poole Economics. Lastly, I include the Census region of each municipality. These regions are reflected as four dummy variables (*Midwest*, *Northeast*, *Pacific*, and *South*), with municipalities placed in the West region servicing as the reference group.

## **Results and Discussion**

The results of estimating the event history analyses for each of the approaches to understanding fiscal health are presented in table 5. Overall, the open-systems model of municipal bankruptcy was statistically significant; with the log likelihoods indicating the model fit the data well. The influence of the control variables remained relatively stable across each of the models, suggesting that the model, and its subsequent results, is robust. The results point to two sets of interesting results. The first set of interesting results relates to the focus of this paper: the utility of the extant approaches to measuring fiscal health. The second set of interesting results relates to the causal factors behind a municipality’s decision to declare bankruptcy.

**Table 5: Event History Analysis Results**

	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>
Efficiency Ratio	-0.3492			
Debt Service Ratio	0.2676***			
Cash Ratio	-96.9439**			
Current Ratio	38.6711			
Brown's 10-Point Test		0.0159		
FCI			-0.0455	
Cash Solvency				-48.7220***
Budget Solvency				4.3266
Long-Run Solvency				-5.3212***
Service Solvency				2.3506***
Council-Manager	5.0010	4.7838	4.7519	4.8027
Mayor-Council	5.2570	4.9654	4.9497	4.6754
Authority	0.1625	0.1159	0.1013	0.2330
Governor	0.3014***	0.3064***	0.3008***	0.2462**
Midwest	5.6934	4.8533	4.8405	5.2448
Northeast	6.1807	5.1569	5.1684	5.6576
Pacific	4.4534	3.5818	3.5890	3.7107
South	4.8826	4.0472	4.0484	4.2663
Hispanic	0.1575**	0.1722***	0.1736***	0.1811***
Male	0.2392**	0.2337**	0.2249**	0.1501
Aged 0 to 17	2.8569**	4.3415***	4.0432***	5.2341***
Aged 18 to 65	15.1124***	18.3672***	17.6352***	19.5780***
Ages 66+	5.8488***	6.5867***	6.3938***	7.2294***
Constant	5.7179***	14.1734***	13.1794***	15.5604***
Log Likelihood	-310.4519	-325.9145	-326.0923	-293.8733

\* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01

Regarding the utility of the measurement approaches, the estimates provide mixed support. In Model 1, which reflects the utility of ratio analysis in predicting bankruptcy, there are conflicting results. While two of the ratios included significantly reflect the bankruptcy decision, the other two do not. Specifically, there is a positive and significant relationship between the debt service ratio of a government and its likelihood of filing for bankruptcy. As a government's debt grows relative to its available revenue, the capacity of a government to continue meeting its fiduciary responsibility diminishes, ultimately contributing to the bankruptcy decision. The results also point to a negative and significant relationship between the government's cash ratio and their decision to file. Intuitively, the effect of the cash ratio is appropriate given that a smaller ratio implies that there are more outstanding liabilities in the government and fewer resources to meet them. Interestingly, neither of the remaining ratios showed an influence on outcomes.

Model 2 reflects the influence of Brown's 10-Point Test on municipal bankruptcy. Despite the reliance upon the test by practitioners, the estimates showed that it had no significant influence on the bankruptcy of the municipalities in the study sample.

Models 3 and 4 reflect the financial condition index (FCI) produced by Wang, Dennis, and Tu's Solvency Test and the individual dimensions of that test, respectively. The results of the analysis show two sides of the same picture. On the one hand, the FCI showed no significant effect, suggesting that the FCI is not a sufficient means of measuring the fiscal health of a government. On the other hand, the individual dimensions of the index show significant influence. Both the cash long-run solvency measurements had a negative, but significant effect on bankruptcy decisions. Conversely, service solvency had a positive and significant effect and budget solvency had no meaningful influence.

The second set of results that the estimates produce relate to the causal factors behind a municipality's decision to declare bankruptcy. As the models control for the political/governmental, demographic, and economic conditions of the municipality, the estimates provide us a degree of understanding about the conditions that lead a government to the bankruptcy decision. In the political/governmental realm, the form of government that a municipality adheres to has no measurable influence, nor does the presence or absence of the authority for a municipality to declare bankruptcy. The political party of the governor, which serves as a reflection of the local political climate of a municipality has a significant effect, with municipalities in states where the governor is a Democrat as being more likely to experience extreme financial distress.

The results also point to no geographic influence, with no significant influence appearing on any of the Census region. They do, however, point to important influences based on the demographics of the community. As the Hispanic share of population grows, so does the likelihood of a bankruptcy decision. The gender dispersion of the population also has an influence, with the share of males serving as a driver to bankruptcy filings. Lastly, there is a positive and significant influence across each of the measures of the population age. While the population aged older than 65 has a larger influence than the 0 to 17 population, the biggest influence is seen on the share of the population that is between the ages of 18 and 65. These results reflect the expectation of services that different segments of the populations have from the government. As the expectation for the services increases, so does the likelihood of the municipality filing for bankruptcy or undergoing control by an emergency financial board.

## **Conclusion**

One of the challenges faced by governments is the understanding of their fiscal health. Given the increase in demand for public services over the past few years, this challenge has become even more important as governments struggle to meet their service commitments and obligations without raising additional revenue. A number of approaches to understanding fiscal health have been developed within the literature (see Wang, Dennis, and Tu 2007; Justice and Scorsone 2013), some of which have gained widespread use (Honadle, Costa, and Cigler 2004), as an attempt to address this challenge. Despite their development, however, none of the approaches have been rigorously tested against instances of fiscal distress.

This paper seeks to reconsider how we measure the financial condition of a government by investigating the utility of several prominent measurement systems. These systems on which this



paper focuses are: ratio analysis, Brown's 10-point Test, and Wang, Dennis and Tu's FCI. Using a rare events history analysis approach, each system is tested for its efficiency in predicting extreme fiscal distress: municipal bankruptcy. To complete the analysis, a panel of 150 municipalities from the Fiscally Standardized Cities (FiSC) database for the period of 1977 to 2012 is adopted.

The results of the event history analysis produced mixed results. Ratio analysis, one of the common approaches to measuring fiscal health, showed a significant effect for some of the ratios included in the study and no effect for others. This allows for the conclusion that the debt service ratio and cash ratio directly reflect the financial position of a government and the efficiency ratio and current ratio do not. Brown's 10-point test was found to have no effect on the bankruptcy decision of a government. The FCI also showed no effect as an index, but did show significance in its deconstructed form.

When looking at all four models, a trend becomes obvious. Measurement systems that are reliant upon a series of variables to describe the financial condition of a government have a more meaningful influence than systems reliant upon an index. Although both the field and the academic literature is encouraging of a single measurement, such efforts might be made in vain. When data is indexed, the unique information about the condition of a government that the data provides may be lost or crowded out. This can be particularly seen in the testing of the FCI, where the index was tested first in its summated form and then retested in its multiple dimensions.

Several important implications should be taken away from this study. First and foremost is that we should reconsider how we measure fiscal health. Rather than abandoning the previous work on the subject altogether, however, our reconsideration should point towards the refinement of measurement systems that utilize multiple perspectives, such as ratio analysis or the individual dimensions of the FCI. This would help avoid the loss of utility that an index approach generates while clarifying what ratios truly affect condition. As noted previously in this study, there are dozens of financial ratios that can be utilized, but not all of them point towards serious and long-term problems for an organization. Some of these ratios are utilized directly in ratio analysis and indirectly in determining the measurement of the FCI dimensions, but there is no certainty of which ratios matter. Research should be geared towards resolving this uncertainty. Second, we should reconsider the concept of fiscal health. Traditionally the concept has been thought of as the generic financial position of an organization. While the understanding might suffice for healthy governments, does it continue to hold true those undergoing extreme fiscal distress? If different financial ratios point towards different aspects of an organization's position, it may be possible that how we measure the position of a healthy government is different from how we measure that of an unhealthy government. Without clarity in what we are intending to measure and what the data is to be utilized for, no single measurement system can emerge.

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